

Claims

1. (original) A method, comprising:
  - detecting electromagnetic radiation returned from a concealed surface associated with a person, the electromagnetic radiation including one or more frequencies in a range of about 200 MHz to about 1 THz;
  - establishing data corresponding to intensity of the returned electromagnetic radiation along the surface and depth along the surface; and
  - adaptively processing the data to determine if a man-made object suspected to be one or more of contraband or a potential security threat is being carried by the person as a function of the intensity along the surface and the depth along the surface.
2. (original) The method of claim 1, wherein the said adaptively processing operates with a map of surface depth difference to determine if the man-made object is being carried by the person as the function of the depth along the surface.
3. (original) The method of claim 1, which includes applying a median filter and one or more morphological filters.
4. (original) The method of claim 1, which includes comparing a first image frame data set to a second image frame data set.
5. (original) The method of claim 1, wherein the object is at least one weapon.
6. (original) The method of claim 1, which includes:
  - irradiating the person with an electromagnetic radiation output from a transducer array; and
  - displaying relative location of the man-made object on a image representative of the person.

7. (original) The method of claim 1, wherein said adaptively processing is performed for each of a number of image portions, the image portions each corresponding to a group of image pixels.

8. (original) The method of claim 7, wherein said adaptively processing further includes:  
utilizing a neural network to process each of the image portions;  
for each of a first set of inputs of the neural network, receiving an image pixel intensity input in correspondence to the image pixels of the group for a respective one of the image portions;  
for each of a second set of inputs of the neural network, receiving a depth difference input from the respective one of the image pixels of the designated group for the one of the image portions; and  
comparing an output from the neural network to a threshold to determine if the object is suspected.

9. (original) A method, comprising:  
irradiating an interrogation region including a person carrying a concealed object;  
detecting electromagnetic radiation returned from the interrogation region in response to said irradiating, the electromagnetic radiation including one or more frequencies in a range of about 200 MHz to about 1 THz;  
establishing data representative of a map of intensity of the electromagnetic radiation returned from the interrogation region and a map of depth along the interrogation region; and  
inputting the data into a neural network to determine if the concealed object is at least one of contraband or a weapon based on the map of intensity and the map of depth.

10. (original) The method of claim 9, which includes:  
applying one or more morphological filters to image output data from the neural network; and  
comparing a first neural network image output for a first image frame to a second neural network image output for a second image frame.

11. (original) The method of claim 9, which includes:

evaluating each of a number of different image data portions with the neural network to determine if the concealed object is present, the image data portions each corresponding to a different group of image pixels, the data representative of the map of intensity corresponding to a two-dimensional map of image pixel intensity;

calculating a two-dimensional map of pixel range as a function of temporal information determined in relation to said irradiating and said detecting; and

determining the data representative of the map of depth in accordance with depth difference based on the two-dimensional map of pixel range.

12. (previously presented) The method of claim 11, which includes displaying relative location of the concealed object on a image representative of the person.

13. (original) The method of claim 9, which includes displaying relative location of the concealed object on a image representative of the person.

14. (original) The method of claim 9, wherein said interrogating includes scanning the person in a portal at a security checkpoint with incident electromagnetic radiation and said establishing includes generating image data corresponding to a number of cylindrical images.

15. (original) The method of claim 9, wherein said establishing includes generating information corresponding to one or more cylindrical images of the person.

16. (original) The method of claim 9, which includes adaptively processing a spatial frequency representation corresponding to at least a portion of an image of the person.

17. (original) A system, comprising:

an array operable to interrogate a person with electromagnetic radiation at one or more frequencies in a range of about 200 MHz to about 1 THz; and

a processing subsystem coupled to the array, the processing subsystem being operable to provide a neural network including a first set of inputs and a second set of inputs, the first set of

inputs being arranged to receive data corresponding to a map of returned electromagnetic radiation intensity along a surface beneath clothing of the person, the second set of inputs being arranged to receive other data corresponding to a map of depth along the surface, the neural network being effective to evaluate if one or more objects suspected of being at least one of contraband or a potential security threat as a function of the map of intensity and the map of depth are concealed by the person and provide one or more corresponding outputs.

18. (original) The system of claim 17, wherein the neural network is of a multilayer perceptron type.

19. (original) The system of claim 17, wherein the map of depth is representative of depth difference and the processing subsystem include means for determining the map of depth from a map of range information.

20. (original) The system of claim 17, further comprising a display device responsive to the one or more outputs to provide at least one image if presence of the one or more objects is indicated.

21. (original) The system of claim 17, wherein the processing subsystem includes means for filtering image information.

22. (original) The system of claim 17, wherein the array is provided in a first panel and further comprising another array in a second panel coupled to the processing subsystem, and the first panel and the second panel are arranged to provide a security checkpoint portal.

23. (original) The system of claim 17, further comprising a platform proximate to said array to support the person and a motor to move at least one of the array and the platform relative to another of the array and the platform to perform a security scan of the person at a security checkpoint.

24. (original) The system of claim 17, wherein the processing subsystem is further operable to generate image data corresponding to a number of cylindrical images of the person.

25. (original) An apparatus, comprising:

a device carrying logic executable by one or more processors to analyze data corresponding to an image of a person obtained from electromagnetic radiation including one or more frequencies in a range of about 200 MHz to about 1 THz, the data being representative of a map of electromagnetic radiation intensity and a map of depth determined relative to the person, the logic being further operable to execute an adaptive process with the data to evaluate if one or more objects suspected of being at least one of contraband or a potential security threat are being concealed by the person as a function of the map of electromagnetic radiation intensity and the map of depth and provide an output indicating the detection of the one or more objects if indicated by the adaptive process.

26. (original) The apparatus of claim 25, wherein the device is in the form of a processor-readable memory and the logic is in the form of a number of instructions stored in the memory.

27. (original) The apparatus of claim 25, wherein the device includes one or more parts of a computer network and the logic is encoded in one or more signals for transmission over the computer network.

28. (original) The apparatus of claim 25, wherein the logic is further operable to determine the map of depth as a depth difference map.

29. (original) The apparatus of claim 28, wherein the logic defines at least one neural network.

30. (original) The apparatus of claim 29, wherein the logic defines means for filtering image pixel information.

31. (currently amended) A method, comprising:  
establishing at least one of a first data set corresponding to intensity of returned  
electromagnetic radiation from an object along a surface of the object and a second data set  
corresponding to depth along the surface; and  
adaptively processing at least one of the first data set and the second data set to identify a  
man-made object suspected to be one or more of contraband or a potential security threat.